

**Remarks and Arguments:**

**In the Drawings**

Examiner requires a set of formal drawings to replace the informal drawings presently on file. In response to the Examiner's requirement, Applicant attaches a set of formal drawings. Applicant submits that formal drawings comply with the Examiner's drawing requirement.

**In the Specification**

Examiner states that the Abstract, as amended previously, introduces new subject matter to the disclosure. Applicant respectfully submits that the statement that the components are "selected to have a higher thermal resistivity below  $T_A$  than above  $T_A$ " is not new matter. Applicant submits that the terms "above" and "below" were inadvertently transposed. Applicant further submits that this amendment is fully supported by the original disclosure. In particular, Applicant directs Examiner to figure 1(a) and the corresponding written description at paragraphs 43 to 45. Figure 1(a) demonstrates clearly that the thermal resistance of the two component mixture is higher below the  $T_A$  than above the  $T_A$ . Accordingly, Applicant submits that the amended Abstract does not include new subject matter. As such, Applicant requests that Examiner's objection under 35 U.S.C. 132 be withdrawn.

Examiner also objects to the Abstract as including run-on sentences. Applicant has amended the Abstract (attached to this response) to correct any potential run-on sentence problems. Accordingly, Applicant request that Examiner withdraw her objection.

Examiner further states that the formula as newly specified in paragraph 46 is new subject matter. Applicant respectfully submits that the corrected formula is not new subject matter. The amendment merely corrects an inaccuracy in a formula that is well known to those skilled in the art; *i.e.*, the numerator and the denominator of this formula were inverted. Applicant does not claim the formula set out in paragraph 46. The formula is used to illustrate a theoretical thermal resistance  $R_1$  for the one stage heat sink, which was described earlier in the paragraph, that has a heat flux (or  $Q$ ) value of  $100 \text{ w.cm}^{-2}$ . Accordingly, Applicant submits that the amended paragraph 46 does not include new subject matter. As such, Applicant requests that the Examiner withdraw her objection under 35 U.S.C. 132.

**In the Claims**

Examiner rejects claims 1 to 12 under 35 USC 112, second paragraph. In particular, Examiner states that claim 1 is a run-on sentence. Applicant has amended claim 1 to correct any potential run-on sentence problems. Amended claim 1 now recites "... a reactor chamber for housing said reactor and a first heat regulating chamber...". Accordingly, Applicant submits that claim 1 is no longer indefinite. As such, Applicant requests that Examiner withdraw her rejection under 35 USC 112, second paragraph.

Examiner also states that the term "therewith" (claim 1, line 6) must be "replaced with a direct recitation of the element(s) referenced thereby." Applicant submits that the word "therewith" has a well known and established meaning; *i.e.*, "with it". As evidence of such, Applicant attaches dictionary pages from the Shorter Oxford Dictionary, The Merriam-Webster Dictionary and the New Penguin English Dictionary, which include the word "therewith" and the meaning thereof. The word "therewith" has been highlighted for the Examiner's convenience. Applicant further submits that to require in all cases direct recitation of all elements referenced thereby, would result in unnecessary prolix. Accordingly, Applicant submits that the term "therewith", having a well known and established meaning, is used correctly in claim 1. As such, Applicant requests that the Examiner withdraw her rejection.

With respect to claim 2, Examiner states that the alternative limitations should be written in proper Markush format. Applicant submits that claim 2 as written complies with the requirements of 35 USC 112, second paragraph, and particularly points out and distinctly claims the Applicant's invention. Claim 2 clearly recites that the second heat regulating chamber contains "at least one of a liquid, a gas, a partial vacuum, a solid and a second heat transfer regulating mixture." There is no ambiguity. Accordingly, Applicant requests that the Examiner withdraw her rejection.

With respect to claim 8, Examiner states that the limitations following "capped" are not clear. Applicant has removed the comma after "capped". The claim now reads "... tubular members capped at at least one end thereof ...". Accordingly, applicant submits that amended claim 8 is clear. As such, Applicant requests that Examiner withdraw her rejection.

For all of the reasons set out above, Applicant respectfully submits that the application as amended is in condition for allowance and action toward that goal is respectfully requested.

Should any further clarification be required kindly contact Applicant's agent at 416-862-5790.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Peter Milne', with a stylized, flowing script.

Peter Milne  
Registration No. 34,534

Enc.

## **ABSTRACT**

A heat transfer regulating mixture is provided, the mixture having a metallic component A with a melting point  $T_A$  and a particulate ceramic component B which is non-wettable by the metallic component A, non-reactive therewith and which has a melting temperature  $T_B$  which is higher than both the temperature  $T_A$  and a desired operating temperature  $T_D$  which is also higher than  $T_A$ . The metallic component A and the particulate ceramic component B and their respective amounts will typically be selected to have a higher thermal resistivity below  $T_A$  than above  $T_A$ . The heat transfer regulating mixture may be incorporated in a thermal flux regulator having the mixture within an enclosure surrounding a heat generating reactor structure.

## **APPENDIX**

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# Shorter Oxford English Dictionary

ON HISTORICAL PRINCIPLES

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**there** /ðeːr/ *unstressed* **ðə** *adverb, conjunction, pronoun, & noun.* Also (now *dialect* & *poet.*) **thar** /ðɑːr/.

[Old English *þær*, *þer* = Old Frisian *þær*, Old Saxon *þar* (Dutch *daar*), Old High German *dar* (German *da*), cogn. with Old Norse, Gothic *þar*, from Germanic base also of *THAT*, *THE*.]

- ▷ **A adverb.** 1 **demonstr.** 1 **a** In or at that place or position. **oe.** 1 **b** Indicating the fact, existence, or occurrence of something, *spec.* as being pointed out as present to the sight or perception. *Freq.* in unemphatic use, as (a) preceding *is*, *was*, *etc.*; (b) introducing a clause or sentence in which the verb precedes the subject; (c) (now *arch.* & *poet.*) following an *aux. verb* or occurring after the verb and before the subject in an *interrog. clause* or sentence; (d) (now *arch.* & *colloq.*) preceding a *rel. clause* with omission of the *rel. pronoun*; (e) *arch.* constituting an antecedent with omission of the following *pronoun*. **oe.** 1 **c** Imparting emphasis in addressing a person; *esp.* (a) following *pers. pronoun*, *name*, *rank*, *etc.* attracting the attention of or summoning the person specified; (b) following *hello*, *hi*, *etc.* greeting a person. *colloq.* 116. **oe.** 1 **d** Imparting emphasis preceding a noun qualified by *that*, *those*. *dialect* & *colloq.* 116.

- 2 To that place or position. **oe.** 1 **3** **a** In that case; *then*. **oe.** 1 **oe.** 1 **b** In that matter or business; in that fact or circumstance; in that respect. **oe.** 1 **c** Referring to something said or done; in those words, in that act. 116. **4** At that point or stage in an argument, proceeding, situation, *etc.*; at that juncture. **ME.**

10 **R. LEHMANN** He won't move... he just lies there. **G. GREENE** Looked up at the... impassive eyes as if he might read there some hint. **T. S. ELIOT** In the mountains, there you feel free. **V. SCANNELL** Nottingham: We lived there for three years or so. **B. BYRON** Lark there no hearts that throb with... pain. **TENNYSON** I will know if there be any faith in man. **V. WOOLF** There was Rebecca at the window. **D. EDEN** So there he was confined to the nursery. **C. OED** Pass along there, please! **J. BAINES** 'Hello there,' I said. 'What's new?' **d** **SIR W. SCOTT** That trunk is mine, and that there band-box. **2** **J. H. NEWMAN** When St. Hubert was brought there. **OED** Going to the meeting?—I am on my way there. **J. B. PRIESTLEY** Miss Trant shot a glance there too. **3b** **J. P. DONLEVY** I'd agree with him there. **A. TYLER** For a while there I imagined I might outdistance him. **c** **Blackwood's Magazine** There you have hit the nail on the head. **OED** You have me there! I cannot tell you. **4** **SHAKES.** *Hamlet* And there put on him What forgeries you please. **G. FARQUHAR** Brother! hold there, friend; I am no kindred to you.

▷ **† III rel. 5** = **WHERE** *adverb* 4. **oe.** 116.

▷ **III as interjection.**

- 6 **Expr.** annoyance, confirmation, triumph, dismay, satisfaction, encouragement, *etc.* Also (*esp.* *redupl.*) used to soothe a child. *etc.* 116.

10 **J. S. WINTER** But there, what's the good of talking about it. **B. PYM** There, let it go. **B. NEIL** This lady has faints... There, there, my dear.

▷ **† B conjunction.** 1 = **WHERE** *conjunction* 1. **oe.** 116.

2 = **WHEREAS** *conjunction* 3. Only in **LME.**

▷ **C pronoun & noun.** That place or position; a place or position there. **LME.**

10 **E. H. SEARS** [Motion] requires a here and a there. **V. NABOKOV** The scene shifts... to Old Russia, from there to England.

**Phrases:** *all there:* see **ALL** *adverb* 1. *all there is to it:* see **TO** *preposition*. *and there's an end:* see **END** *noun*. *been there, done that, (bought the T-shirt) colloq.* *expr.* boredom, impatience, or total lack of interest due to overfamiliarity with something. *have been there before* *colloq.* have had previous experience of or be fully conversant with that matter or proceeding. *here and there:* see **HERE** *adverb* *etc.* *here, there, and everywhere:* see **HERE** *adverb* *etc.* *In there* *US slang* (a) (*esp.* of jazz music) excellent, superlative; (b) well-informed, conversant. *neither here nor there:* see **HERE** *adverb* *etc.* *out there:* see **OUT** *adverb*. *so there* *colloq.* *expr.* defiance or defiant triumph. *that there* *colloq.* that matter, that behaviour. *then and there, there and then:* see **THEN** *adverb* *etc.* *there is no saying:* see **SAYING** 1. *there is nothing in it:* see **NOTHING** *pronoun & noun*. *there it is:* that is the situation; nothing can be done about it. *there or thereabouts* in or very near that place or position; *fig.* something like that, approximately. *there's* (a) you are a dear, a good girl, *etc.*, by virtue of present or future obedience or cooperation; (b) *there's* — for you: *expr.* approval or disapproval of something; *Welsh dial.* how — someone or something is. *there's a thing:* see **THING** *noun*. *there you are* *colloq.* (a) = *there you go* below; (b) that process or action is or will be straightforward; the thing is done. *there you go* *colloq.* (a) this is what you wanted *etc.*; (b) *expr.* confirmation, triumph, resignation, *etc.* *up there:* see **UP** *adverb* & *adjective*.

**Comb.** *thereabouts, thereabouts* *adverbs* (a) about or concerning or near that thing *etc.*; (b) about or near that place, in the neighbourhood. *fig.* approximately. (*freq.* in *there or thereabouts* above; *thereabove* *adverb* (*rare*) (a) above or on top of that; more than that; (b) in that place above; in heaven; *thereafter* *adverb* (a) now chiefly *formal* after that *esp.* in a book or document; (b) *arch.* accordingly; *thereagainst* *adverb* (a) against that; *thereamong* *adverb* (long *arch.* *rare*) among that, those, or them; *thereant* *adverb* (*Scot.* & *north*) about that matter; relating thereto; *thereat* *adverb* (a) at that place; there; (b) on account of that; after that; *thereaway, thereaways* *adverbs* (chiefly *Scot.* & *north*) (a) to that place; (b) thereabouts; *therebeside* *adverb* (now *arch.* & *poet.*) by the side

of that; next to that; nearby; *therefrom* *adverb* (*arch.*) from that; from that place; away from there; *therehence* *adverb* (*obsolete* *exc. dial.*) (a) from or out of that place; from there; (b) from that source or origin; from that fact or circumstance; *therewith* *adverb* (*arch.*) into that place; *theroon* *adverb* (*arch.*) (a) on that or it; (b) in that, therein; (c) = *thereupon* below; *therout* *adverb* (a) (long *rare* or *obsolete*) outside that place *etc.*; without; (b) (*arch.*) from or out of that, from that source; (c) (now *Scot.*) out of doors; in the open; abroad; in existence; (d) (now *Scot.*) out from that place *etc.*; *thereover* *adverb* (a) (a) over or above that; (b) *fig.* in reference to that; concerning that; *thereright* *adverb* (*obsolete* *exc. dial.*) straightaway, forthwith; *therethrough* *adverb* (*arch.*) (a) through that or it; (b) by means of that, by reason of that; thereby; *thereto* *adverb* (now chiefly *formal*) (a) to that or it; to that place *etc.*; (b) to that matter or subject; with regard to that point; (c) in addition to that; besides; moreover; *therefore* *adverb* (long *formal*) before that time; previously to that; *thereunder* *adverb* (*rare*) toward that; *thereunder* *adverb* (*formal*) under that or it; (*esp.* in a book or document) under that title, heading, *etc.*; according to that; *thereto* *adverb* (*arch.*) to that or it; *therewith* *adverb* (a) (a) with that (*esp.* of an addition to a document); in addition to that; besides; (b) on that being done or said; (directly) after that; *thereupon* (c) (long *rare*) by means of that; thereby; (d) on account of that; in consequence of that; *therewithal* *adverb* (*arch.*) = *therewith* (a), (b) above; *therewithin* *adverb* (*arch.*) within or into that place; within there. **oe.** 1 **thereness *noun* the fact or condition of being there 117.**

**thereby** /ðeːrɪ/ *adverb.* Orig. two words. **oe.**

[from **THERE** + **BY** *preposition*.]

- 1 By that means, as a result of that; through that. **oe.** 1 **2** Beside, adjacent to, or near that. Now *arch.* & *dial.* 116. **3** Thereabouts, approximately. **Scot.** 116.

10 **1** **New York Times** Two great families would come together and thereby found a new line.

**therefore** /ðeːfɔː/ *adverb & noun.* **oe.**

[from **THERE** + **FORE** *adverb & preposition*.]

▷ **A adverb.** Also (now the only form in sense 1, rare in sense 2) *therefor* /ðeːfɔː/.

- 1 For that; for it; now *esp.* for that object or purpose. Now chiefly *formal*. **oe.** 1 **2** For that reason, on account of that; accordingly; consequently. **ME.**

10 **1** **W. MORRIS** The love I had therefore. *Trade Marks Journal* Machines for resurfacing ice rinks and parts and fittings therefore. **2** **M. ROBERTS** Felix has failed, and is therefore destined for the... secondary modern. **G. PRIESTLAND** Sometimes I think I only exist on paper—that I write, therefore I am.

▷ **B noun.** The word 'therefore' as marking a conclusion; an expressed conclusion or inference. 117.

**therein** /ðeːrɪn/ *adverb.* Now chiefly *formal*. **LOE.**

[from **THERE** + **IN** *preposition*.]

- ▷ **I demonstr.** 1 In that place; *esp.* in that book or document; into that place. **LOE.** 1 **2** In that matter, case, *etc.*; in that particular. **ME.** 1 **3** Inside, indoors. **Scot.** 119.

▷ **† II rel. 4** In which; wherein. **LOE**—**LME.**

**Comb.** *therein* *in* a later part of that document *etc.*; *thereinbefore* in an earlier part of that document *etc.*

**theremin** /θeremɪn/ *noun.* **E20.**

[Léon Theremin (1896–1993), Russian engineer, its inventor.]

An electronic musical instrument in which the tone is generated by two high-frequency oscillators and the pitch controlled by the movement of the performer's hand towards and away from the circuit.

**thereof** /ðeːrɒv/ *adverb.* Now chiefly *formal*. **oe.**

[from **THERE** *adverb* + **OF** *preposition*.]

- 1 Of that, concerning that. **oe.** 1 **2** From that, from there. Now *rare*. **ME.**

10 **1** **D. MELTZER** Dreams and analyses thereof to fill out his book. **2** **MILTON** Much more good thereof shall spring.

**Therian** *noun & adjective* var. of **TERESIAN**.

**thereupon** /ðeːrɪpən/ *adverb.* Orig. two words. **ME.**

[from **THERE** + **UPON** *preposition*.]

- 1 Upon that or it. *arch.* **ME.** 1 **2** On that being done or said; (directly) after that. **LME.** 1 **3** In consequence of that; on that subject or matter; with reference to that. **LME.**

10 **2** **J. CONRAD** I gave him the tip... Thereupon he lost all interest in me.

**theri-** combining form see **THERIO-**.

**theriac** /θɪˈrɪæk/ *noun & adjective.* *arch.* **LME.**

[Latin *theriaca*; see **TREACLE** *noun*.]

▷ **A noun.** An antidote to poison, *esp.* to the bite of a poisonous snake. Cf. **TREACLE** *noun* 1. **LME.**

▷ **† B adjective.** = **THERIACAL** *rare*. Only in **LME.**

**theriacal** /θɪˈrɪæk(ə)l/ *adjective.* Now *rare* or *obsolete*. **E17.**

[from **prec.** + **-AL**.]

Pertaining to or of the nature of a theriac; antidotal.

**therian** /θɪˈrɪən/ *adjective & noun.* **M20.**

[from *mod. Latin* *Theria* (see below), from Greek *théria* pl. of *thērion* wild animal; see **-AN**.]

**zoology.** ▷ **A adjective.** Of or pertaining to the subclass *Theria* which includes all living mammals except monotremes (prototherians). **M20.**

▷ **B noun.** A mammal of this subclass. **L20.**

**therio-** /θɪˈrɪəʊ/ combining form. Before a vowel **theri-**.

[Greek, from *thērion* wild animal; see **-O-**.]

Of, pertaining to, or resembling an animal. *esp.* (in *zoology*) a mammal. Cf. **THERO-**.

▷ **therion** /θɪˈrɪən/ *adjective* of or pertaining to a god represented as combining animal and human forms 119. **theriologic** *noun* the branch of veterinary science which deals with the reproductive systems of animals 116. **theriocracy** *noun* the worship of animals or of theriomorphic gods 119. **theriologic** *adjective* (*rare*) of or pertaining to the systematic study of animals; *zoological*; only in 117.

**theriomorph** /θɪˈrɪəʊmɔːf/ *noun & adjective.* **E20.**

[from **prec.** + **-MORPH**.]

▷ **A noun.** 1 A representation of an animal form in art. **E20.**

2 = **THEROMORPH**. *rare*. **E20.**

▷ **B adjective.** Having the form or characteristics of an animal. **M20.**

**theriomorphic** /θɪˈrɪəʊmɔːfɪk/ *adjective.* **L19.**

[formed as **prec.** + **-IC**.]

*Esp.* of a god; having the form of an animal.

▷ **theriomorphism** *noun* representation of a person or god in the form of an animal; ascription of animal characteristics to a person. **E20.**

**therm** /θɜːm/ *noun*. Pl. **thermos** /θɜːmz/. (*arch.*) **therms**. **M16.**

[Old French *thermes* (pl.) from Latin *thermae* from Greek *thermai* hot baths, from *thermē* heat.]

Chiefly *CLASSICAL ANTIQUITIES* A public bath. Also (*rare*), a hot spring. *Usu.* in pl.

**therm** /θɜːm/ *noun*. **L19.**

[from Greek *thermos* hot, *thermē* heat.]

**PHYSICS.** 11 = **CALORIE** (b). Only in 119.

2 A quantity of heat equal to 100,000 British thermal units or 1.055 × 10<sup>6</sup> joules, *esp.* as (formerly) used in the UK as the statutory unit of gas supplied. **E20.**

**therm** /θɜːm/ *noun* & *verb*. **E10.**

[Alt. of **TERIS** *noun*.]

▷ **A noun.** 1 A pedestal for a bust or statue, *esp.* of a god. **E10.**

2 A rectangular tapering leg or foot of a chair, table, *etc.*, fashionable in the 18th cent. **110.**

▷ **B verb trans.** Make (a leg or foot of a chair, table, *etc.*) in a rectangular tapering form. **110.**

**therm** /θɜːm/ *noun*. *colloq.* Now *rare* or *obsolete*. **L10.**

[Abbreviation.]

= **THERMOMETER**.

**therm-** combining form see **THERMO-**.

**thermoe** *noun* pl. see **THERM** *noun* 1.

**thermol** /θɜːm(ə)l/ *adjective & noun.* **M10.**

[French, from Greek *thermē* heat + **-AL**; in sense 1 partly formed as **THERM** *noun* 1.]

▷ **A adjective.** 1 Of, pertaining to, or of the nature of hot springs; (of a spring *etc.*) naturally hot or warm; having hot springs. **M10.**

2 *Gen.* of or pertaining to heat; determined, measured, caused, or operated by heat. **M19.** 1 **b** Of underwear *etc.*; promoting the retention of heat. **L20.**

**Special collocations:** *thermol cognition* = *thermal motion* below; *thermol analysis* *chemism* analysis of a substance by examination of the way its temperature falls on cooling or rises on heating. *thermol barrier* *atomism* = *heat barrier* s.v. **HEAT** *noun*.

*thermol bromstrahlung* electromagnetic radiation produced by the thermal motion of charged particles in a plasma. *thermol capacity* the capacity of a body to store heat, measured by the quantity of heat required to raise its temperature one degree. *thermol conductivity* the rate at which heat passes through a substance, expressed as the amount of heat that flows per unit time through unit area with a temperature gradient of one degree per unit distance. *thermol cycle* a cycle in which the temperature of a substance rises or falls and then returns to its initial value. *thermol death point* the lowest temperature at which a micro-organism can be killed by heat exposure under specified conditions. *thermol diffusion* diffusion occurring as a result of the thermal motion of atoms or molecules, *esp.* as a technique for separating gaseous compounds of different isotopes of an element (which diffuse at different rates in a temperature gradient). *thermol diffusivity* the thermal conductivity of a substance divided by the product of its density and its specific heat capacity. *thermol efficiency* the efficiency of an engine measured by the ratio of the work done by it to the heat supplied to it. *thermol equilibrium* a state in which no net gain, loss, or transfer of heat occurs. *thermol imaging* the technique of using the heat given off by objects or substances to produce an image of them or to locate them. *thermol inerts* resistance to change of temperature. *thermol ionos* = *thermionic lance*. *thermol motion* motion of atoms or other particles due to their thermal energy. *thermol neutron* a neutron which is in thermal equilibrium with its environment (in contrast to a slow neutron). *thermol noise* *atomism* electrical fluctuations arising from the random thermal motion of electrons. *thermol paper* heat-sensitive paper used in thermal printers. *thermol pollution* the production of heat, or the discharge of warm water, *esp.* into a river or lake, on a scale that is potentially harmful ecologically. *thermol printer* a printer having a matrix of fine pins as the printhead, which are selectively heated to form a character on heat-sensitive paper. *thermol radiation:*

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**hooter.** 4 used as an interjection to express satisfaction, approval, encouragement, or defiance: *There, it's finished; There, it didn't hurt much, did it?* 5 be there for somebody to give somebody support, advice, and love or friendship. have been there before informal to know about or have experienced something already. so there used to express defiance and emphasize a refusal: *I won't go, so there!* there and back for a round trip. there and then at once. there it is such is the unfortunate fact. there's a ... used when urging a course of action: *Don't sulk, there's a dear!* there, there used when trying to comfort somebody. there you are 1 used when handing or presenting something to somebody. 2 I told you so. [Old English *ther*]

**Usage note**  
there, their, or they're? See note at **THEIR**.

**there<sup>2</sup> pronoun** used to introduce a sentence or clause that expresses the idea of existence: *What is there to eat?*; *There won't be another opportunity.*

**there<sup>3</sup> noun** that place or point.

**there<sup>4</sup> adj non-standard** used for emphasis between a demonstrative and the following noun: *that there cow.*

**thereabouts (NAmE also thereabout) adv** 1 in that vicinity. 2 near that time, number, degree, or quantity: *a boy of 18 or thereabouts.*

**thereafter adv** after that.

**thereat adv formal** 1 at that place. 2 because of or after that.

**thereby adv** 1 by that means; as a result of which. 2 in which connection: *And thereby hangs a tale* — Shakespeare.

**there'd /dheəd/ contraction** there had; there would.

**therefor adv formal** for that, or in return for that.

**therefore /d'hu:fə/ adv** 1 because of that; consequently: *The baby was tired and therefore irritable.* 2 as this proves: *I think, therefore I exist.*

**therefrom /dheə'fɒm/ adv formal** from that or it.

**therein adv formal** in that; esp in that respect: *Therein lies the problem.*

**thereinafter /dheə'in'ɑftə/ adv formal** in the following part of that matter, e.g. writing, document, or speech.

**thereinto /dheə'ri:təʊ/ adv archaic** into that or it.

**there'll /dheə'l/ contraction** there will; there shall.

**thereof adv formal** 1 of that or it. 2 from that or it.

**thereon adv formal** on or onto that or it: *a text with a commentary thereon.*

**there's /dheəz/ contraction** 1 there is. 2 there has.

**thereto adv formal** 1 to that place. 2 to that matter or document: *conditions attaching thereto.* 2 archaic in addition.

**theretofore /dheə'tə'fəʊ, dheə'təʊ'fəʊ/ adv formal** up to that time.

**thereunder adv formal** under that or it: *the heading and the items listed thereunder.*

**thereupon adv formal** 1 on that matter. 2 immediately after that.

**therewith adv formal** with that or it: *a letter enclosed therewith.* 2 archaic thereupon, forthwith

**therewithal /dheə'wiðəʊl/ adv formal** therewith. 2 archaic besides.

**therianthrope /,θiəriən'trɒpik/ adj** said of mythical creatures: combining human and animal form. [Greek *thērion* beast + *anthropos* man]

**theriomorphic /,θiəriə'h'mɔ:fik/ adj** said esp of a god: having an animal form. [Greek *thēriomorphos*, from *thērion* beast + *morphe* form]

**therm /tuhm/ noun** a quantity of heat equal to 100,000Btu (about 105,506J). [Greek *thermē* heat]

**therm- or thermo- comb. form** forming words, denoting: heat: *thermion; thermostat*. [Greek, from *thermē* heat]

**-therm comb. form** forming nouns, denoting: an animal having a particular body temperature: *ectotherm*. [Greek *thermē* heat]

**thermae /'tuhmee/ noun** public baths, esp in ancient Greece or Rome. [via Latin from Greek *thermai*, pl of *thermē* heat]

**therma<sup>1</sup> /'tuhm/ adj** 1 relating to or caused by heat: *thermal stress; thermal insulation.* 2 designed to prevent the dissipation of

body heat: *thermal underwear.* >> **thermally adv.** [Greek *thermē* heat]

**thermal<sup>2</sup> noun** 1 a rising body of warm air. 2 (in pl) thermal underwear or clothing.

**thermal barrier noun** a limit to increase in aircraft or rocket speeds imposed by aerodynamic heating.

**thermal capacity noun** = HEAT CAPACITY.

**thermal efficiency noun** the ratio of the amount of work done by a heat engine to the amount of energy supplied to it.

**thermal imaging noun** a technique for detecting and producing a picture of an esp hidden heat source, used e.g. to find missing people or locate a target. >> **thermal imager noun.**

**thermalize or thermalise verb trans** to cause (neutrons) to lose energy in a reactor and become thermal neutrons as a prelude to nuclear fission.

**thermal neutron noun** a neutron in thermal equilibrium with its surroundings.

**thermal printer noun** a printer that uses a heated printing device to produce an image on heat-sensitive paper.

**thermal reactor noun** a nuclear reactor in which fission is mainly caused by thermal neutrons.

**thermal spring noun** = HOT SPRING.

**thermic /'tuhmik/ adj** = THERMAL: *thermic energy.* >> **thermically adv.**

**thermion /'tuhmi-an, -on/ noun** an electrically charged particle, specif an electron, emitted by an incandescent substance. [THERM- + ION]

**thermionic /'tuhmi'ɒnik/ adj** 1 relating to the emission of thermions. 2 denoting or relating to a device, e.g. a valve, that uses thermionic electrons as charge carriers.

**thermionic tube noun** = THERMIONIC VALVE.

**thermionic valve noun** an electron tube in which a regulated flow of electrons is produced by thermionic emission from a heated CATHODE (a conducting structure with a negative electric charge), used esp for controlling the flow of current in an electric circuit.

**thermistor /'tuh'mistə/ noun** a semiconducting electrical resistor whose resistance varies significantly with temperature. [contraction of *thermal resistor*]

**Thermite /'tuhmiet, 'tuhmæt/ noun trademark** = THERMITE.

**thermite /'tuhmiet/ noun** a mixture of aluminium powder and iron oxide that produces a great deal of heat when ignited and is used in welding and in incendiary bombs.

**thermo- comb. form** see THERM-.

**thermochemistry /'tuhmoh'kemistri/ noun** the branch of chemistry dealing with heat changes in chemical reactions. >> **thermochemical adj, thermochemist noun.**

**thermochromic /'tuhmoh'krohnik/ adj** able to change colour, reversibly, when heated or cooled, or involving a colour-changing process of this kind.

**thermocline /'tuhmohklien/ noun** a layer of water in a lake, sea, etc that separates an upper warmer zone from a lower colder zone; specif a stratum in which temperature declines at least 1 °C with each metre increase in depth.

**thermocouple /'tuhmohkupi/ noun** a combination of two conductors for producing a thermoelectric effect used in measuring temperature differences.

**thermodynamics /'tuhmohdie'namiks, -di'namiks/ pl noun** (treated as sing. or pl) the mechanical action of, or relations between, heat and other forms of energy, or the branch of physics that deals with this.

#### Editorial note

Thermodynamics is used to assess the efficiency of thermal processes and to discuss the equilibrium composition of chemical reactions. There are three laws of thermodynamics. The first law expresses the conservation of energy and the equivalence of heat and work. The second law introduces the concept of increasing entropy as the signpost of spontaneous change. The third law expresses the unattainability of absolute zero — Professor Peter Atkins.

>> **thermodynamic adj, thermodynamically adv, thermodynamicalst /-namasist/ noun.**

**thermoelectric /'tuhmohi'lektrik/ adj** 1 relating to or dependent on the relationship between temperature and the electrical properties of materials. 2 producing electricity by means of differ-